

ABSTRACT

An ultra thin MOSFET device structure located on an insulator layer, and a method of forming the ultra thin MOSFET device structure featuring a strained silicon channel located on the underlying insulator layer, has been developed. After epitaxial growth of a semiconductor alloy layer such as silicon - germanium (SiGe), on a first semiconductor substrate, a strained silicon channel layer, under biaxial tensile strain, is epitaxially grown on the underlying semiconductor alloy layer. Bonding of the strained silicon channel layer of the first semiconductor substrate, to a silicon oxide layer located on the surface of a second semiconductor substrate, is followed by a cleaving procedure performed at the interface of the strained silicon channel layer and the underlying semiconductor alloy layer, resulting in the desired configuration comprised of strained silicon channel layer - underlying insulator layer - second semiconductor substrate. The MOSFET device is then formed featuring the strained silicon channel layer, on the underlying silicon oxide layer, with enhanced carrier mobility realized as a result of the biaxial tensile strain of the silicon channel layer.

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